

IN THE CLAIMS

Please amend the claims as follows:

1 (Currently Amended): A method of embedding data in material, the method comprising the steps of:

producing transform coefficients $[[C_i]] \underline{C_i}$ representing a transform of the material, and

combining the coefficients $[[C_i]] \underline{C_i}$ with data symbols $[[R_i]] \underline{R_i}$ to produce modified coefficients $[[C'_i]] \underline{C'_i}$ where

$$C'_i = C_i + \alpha_i R_i \quad \underline{C'_i} = \underline{C_i} + \alpha_i \underline{R_i}$$

the method further comprising determining an adaptation strength α_i $[[\alpha_i]]$ for each unmodified coefficient $[[C_i]] \underline{C_i}$ as a function $F\{\underline{C_n}\}_i \quad F\{\underline{C_n}\}_i$ of a predetermined set $\{\underline{C_n}\}_i$ $\{\underline{C_n}\}_i$ of transform coefficients $[[C_n]] \underline{C_n}$ which set excludes the coefficient $[[C_i]] \underline{C_i}$ wherein the coefficients are serially ordered and the coefficients $[[C_n]] \underline{C_n}$ are coefficients preceding coefficient $[[C_i]] \underline{C_i}$.

2 (Currently Amended): [[A]] The method according to claim 1, wherein the coefficients the set $\{\underline{C_n}\}_i \quad \{\underline{C_n}\}_i$ vary with i.

3 (Currently Amended): [[A]] The method according to claim 1, wherein the number $[[N_i]] \underline{N_i}$ of coefficients in the set $\{\underline{C_n}\}_i \quad \{\underline{C_n}\}_i$ varies with i.

4 (Currently Amended): [[A]] The method according to claim 1, wherein the coefficients of the set $\{\underline{C_n}\}_i \quad \{\underline{C_n}\}_i$ have a predetermined positional relationship with the coefficient $[[C_i]] \underline{C_i}$ to be modified.

5 (Currently Amended): [[A]] The method according to claim 1, wherein the coefficients represent a spatial frequency transform of the material.

6 (Currently Amended): [[A]] The method according to claim 1, wherein the coefficients represent a wavelet transform of the material.

7 (Currently Amended): [[A]] The method according to claim 6, wherein the transform produces coefficients [[Ci]] C_i in a plurality of bands.

8 (Currently Amended): [[A]] The method according to claim 7, wherein the transform coefficients forming the set {C_n}_i {C_n}_i are all in the same band.

9 (Currently Amended): [[A]] The method according to claim 7, wherein the transform coefficients forming the set {C_n}_i {C_n}_i are in a plurality of bands.

10 (Currently Amended). [[A]] The method according to claim 1, wherein the said function F{C_n}_i F{C_n}_i is such that

$$\alpha_i = \frac{1}{N_i} \cdot \sqrt{\sum C_n^2} \text{ for } n = i-1 \text{ to } i-N_i \text{ for } N_i \neq 0 \text{ and } \alpha_i = k \text{ for } N_i = 0$$

$$\underline{\alpha_i = \frac{1}{N_i} \cdot \sqrt{\sum C_n^2} \text{ for } n = i-1 \text{ to } i-N_i \text{ for } N_i \neq 0 \text{ and } \alpha_i = k \text{ for } N_i = 0,}$$

where [[Ni]] N_i is the number of coefficients [[Cn]] C_n in set i.

11 (Currently Amended): [[A]] The method according to claim 1, wherein the said data symbols [[R_i]] R_i are of a pseudo random symbol sequence having symbols [[P_i]] P_i modulated by data [[W_j]] W_j to be embedded.

12 (Currently Amended): Apparatus An apparatus for embedding data in material, comprising

a transformer for producing transform coefficients [[C_i]] C_i representing a transform of the material, and

a combiner for combining the coefficients [[C_i]] C_i with data symbols [[R_i]] R_i to produce modified coefficients [[C_{i'}]] C_{i'} where

$$C_i' = C_i + \alpha_i R_i \quad C_i' = C_i + \alpha_i R_i,$$

the apparatus further comprising

a calculator for calculating an adaptation strength [[α_i]] α_i for each unmodified coefficient [[C_i]] C_i as a function F{C_n}_i-F{C_n}_i of a predetermined set {C_n}_i-{C_n}_i of transform coefficients [[C_n]] C_n which set excludes the coefficient [[C_i]] C_i, wherein the coefficients are serially ordered and the coefficients [[C_n]] C_n are coefficients preceding coefficient [[C_i]] C_i.

13 (Currently Amended): The apparatus Apparatus according to claim 12, wherein the coefficients of the set {C_n}_i-{C_n}_i vary with i.

14 (Currently Amended): The apparatus Apparatus according to claim 12, wherein the unmodified coefficients of the set {C_n}_i-{C_n}_i have a predetermined positional relationship with the coefficient [[C_i]] C_i to be modified.

15 (Currently Amended): The apparatus Apparatus according to claim 12, wherein the coefficients represent a spatial frequency transform of the material.

16 (Currently Amended): The apparatus Apparatus according to claim 12, wherein the coefficients represent a wavelet transform of the material

17 (Currently Amended): The apparatus Apparatus according to claim 16, wherein the transformer produces coefficients $[[C_i]] \underline{C_i}$ in a plurality of frequency bands.

18 (Currently Amended): The apparatus Apparatus according to claim 17, wherein the transform coefficients forming the set $\{C_n\}_i \underline{\{C_n\}_i}$ are all in the same band.

19 (Currently Amended): The apparatus Apparatus according to claim 18, wherein the transform coefficients forming the set $\{C_n\}_i \underline{\{C_n\}_i}$ are in a plurality of bands.

20 (Currently Amended): The apparatus Apparatus according to claim 12, wherein the said function $F\{C_n\}_i \underline{F\{C_n\}_i}$ is such that

$$\alpha_i = \frac{1}{N_i} \cdot \sqrt{\sum C_n^2} \text{ for } n = i-1 \text{ to } i-N_i \text{ for } N_i \neq 0 \text{ and } \alpha_i = k \text{ for } N_i = 0$$

$$\underline{\alpha_i = \frac{1}{N_i} \cdot \sqrt{\sum C_n^2} \text{ for } n = i-1 \text{ to } i-N_i \text{ for } N_i \neq 0 \text{ and } \alpha_i = k \text{ for } N_i = 0,}$$

where $[[N_i]] \underline{N_i}$ is the number of coefficients $[[C_n]] \underline{C_n}$ in set i .

21 (Currently Amended): [[A]] The method according to claim 1, wherein the data is imperceptibly embedded in the other material.

22 (Currently Amended): [[A]] The method according to claim 1, wherein the set $\{C_n\}_i \{C_n\}_i$ consists of includes unmodified coefficients.

23 (Currently Amended): The [[A]] method or apparatus according to claim 1, wherein the set $\{C_n\}_i \{C_n\}_i$ consists of modified coefficients preceding [[Ci]] C_i where the coefficients are serially ordered.

24 (Currently Amended): [[A]] The method or apparatus according to claim 1, wherein the set $\{C_n\}_i \{C_n\}_i$ comprises at least one modified coefficient and at least one unmodified coefficient.

25 (Currently Amended): A method of removing data embedded in material ~~according to the method of claim 1, the detecting method further comprising:~~

determining the values of the data symbols [[R_i]] R_i ;
calculating, for each modified coefficient [[C_{i'}]] C_i' , the value of the said function $F\{C_n\}, F\{C_n\}_i$ of the corresponding set $\{C_n\}_i$ of coefficients [[C_n]] C_n to determine [[α_i]] α_i ; and

for each modified coefficient [[C_{i'}]] C_i' , subtracting therefrom $\alpha_i R_i - \underline{\alpha_i} R_i$ to restore the unmodified coefficient value [[C_i]] C_i , wherein the coefficients are serially ordered and the said set $\{C_n\}_i$ consists of modified coefficients preceding coefficient [[C_i]] C_i .

26 (Currently Amended): [[A]] The method according to claim 25, wherein the said set $\{C_n\}_i$ consists of includes restored coefficients [[C_i]] C_i , and comprising the the

method further comprising a step of using a restored coefficient [[Ci]] \underline{C}_i as a coefficient of another set $\{\underline{C}_n\}_j \setminus \{\underline{C}_n\}_i$ of coefficients for restoring another coefficient [[Cj]] \underline{C}_j .

27 (Currently Amended): The [[A]] method according to claim 25, wherein the said set $\{\underline{C}_n\}_i \setminus \{\underline{C}_n\}_i$ comprises at least one modified coefficient and at least one restored coefficient, the coefficients preceding [[Ci']] \underline{C}'_i .

28 (Currently Amended): [[A]] The method according to claim 25, further comprising the step of determining the values of the data bits [[Wj]] \underline{W}_j embedded in material by correlating a reference pseudo random symbol sequence with the modified coefficients [[Ci']] \underline{C}_i' and decoding the correlation values to determine the data [[Wj]] \underline{W}_j modulating the pseudo random sequence and remodulating the reference sequence with the said data to restore [[Ri]] \underline{R}_i .

29 (Currently Amended): An apparatus Apparatus for removing data embedded in material ~~according to the method of claim 1~~, the apparatus comprising:

a processor for determining the values of the symbols [[Ri]] \underline{R}_i ;

a calculator for calculating, for each modified coefficient [[Ci']] \underline{C}_i' , the value of the said function $F\{\underline{C}_n\}_i F\{\underline{C}_n\}_i$ of the corresponding set $\{\underline{C}_n\}_i \setminus \{\underline{C}_n\}_i$ of coefficients [[Cn]] \underline{C}_n to determine $[[\alpha_i]] \underline{\alpha}_i$; and

a subtractor which, for each modified coefficient [[Ci']] \underline{C}_i' , subtracts therefrom $\alpha_i \cdot \underline{R}_i$ $\underline{\alpha}_i \cdot \underline{R}_i$ to restore the unmodified coefficient value [[Ci]] \underline{C}_i , which thereby becomes available for use as an unmodified coefficient of another set $\{\underline{C}_n\}_i \setminus \{\underline{C}_n\}_i$ of unmodified coefficients [[Cn]] \underline{C}_n for restoring another coefficient [[Ci']] \underline{C}_i' , wherein the coefficients are serially ordered and the said set $\{\underline{C}_n\}_i \setminus \{\underline{C}_n\}_i$ consists of coefficients preceding coefficient [[Ci]] \underline{C}_i .

30 (Currently Amended): The apparatus Apparatus according to claim 29, wherein the said set $\{C_n\}_i$ $\{C_n\}_i$ consists of restored coefficients $[[C_i]] \underline{C}_i$ and further comprising the further step of means for using a restored coefficient $[[C_i]] \underline{C}_i$ as a coefficient of another set $\{C_n\}_{i+1}$ $\{C_n\}_{i+1}$ of coefficients for restoring another coefficient $C_{i+1} \underline{C}_{i+1}$.

31 (Currently Amended): The apparatus Apparatus according to claim 30, wherein the said set $\{C_n\}_i$ $\{C_n\}_i$ consists of includes modified coefficients preceding coefficient $[[C_i]] \underline{C}_i$.

32 (Currently Amended): The apparatus Apparatus according to claim 30, wherein the said set $\{C_n\}_i$ $\{C_n\}_i$ comprises at least one modified coefficient and at least one restored coefficient, the coefficients preceding $[[C'_i]] \underline{C}'_i$.

33 (Currently Amended): The apparatus Apparatus according to claim 29, further comprising comprising means for determining the values of the data bits $[[W_j]] \underline{W}_j$ embedded in the material, said means for determining comprising a correlator for correlating a reference pseudo random symbol sequence with the modified coefficients $[[C'_i]] \underline{C}'_i$, a decoder for decoding the correlations to determine the data $[[W_j]] \underline{W}_j$ modulating the modulated sequence and a modulator for remodulating the reference sequence with the said data to restore $[[R_i]] \underline{R}_i$.

34 (Previously Presented): A computer program product arranged to carry out the method of claim 1 when run on a computer.

35 (Currently Amended): A computer program product arranged to carry out the method of claim 25 when run on a computer.

36 (Currently Amended): The [[A]] method or apparatus according to claim 1, wherein the material is video material.

37 (Currently Amended). The [[A]] method or apparatus according to claim 1, wherein the material is audio material.

38 (Currently Amended): The [[A]] method or apparatus according to claim 1, wherein the material is audio/visual material.

39-58 (Cancelled).

59 (Currently Amended): The Apparatus apparatus according to claim 12, wherein the data is imperceptibly embedded in the other material.

60 (Currently Amended): The Apparatus apparatus according to claim 12, wherein the set $\{C_n\}$ consists of unmodified coefficients.

61 (Currently Amended): The Apparatus apparatus according to claim 12, wherein the set $\{C_n\}$ consists of $\{C_n\}_i$ includes unmodified coefficients.

62 (Currently Amended): The Apparatus apparatus according to claim 12, wherein the set $\{C_n\}_i, \{C_{n_i}\}_i$ comprises at least one modified coefficient and at least one unmodified coefficient.